Defeating India’s silent killer: The fight to diagnose and treat cervical cancer
Oncquest Laboratories is a state-of-the-art Clinical Diagnostics Laboratory, with a national footprint of over 1000 collection centres and wholly owned laboratory facilities in Delhi, Bangalore and Ludhiana.

Ensures Diagnostic & Prognostic Confidence in Early Detection and Management

Future of DIAGNOSIS is here

- Started as a National Reference Laboratory over a decade ago, Oncquest is now involved in Clinical Diagnostics, Corporate Health Services, Hospital Laboratory Management, Clinical Trial Support, and Research & Development.
- Our menu of over 4000 individual tests stands testament to our dedication in providing a comprehensive offering to our partners, and patients.
- Largest number of College of American Pathologists (CAP) certified auditors working in-house.
- Leading National Laboratory in Cancer Diagnostics in: Number of Assays, and Technologies.

Oncquest Laboratories Ltd.
Regd. Office & Main Laboratory: 3, Factory road, Adj. Safdarjung Hospital, New Delhi - 110029 | Fax: 011-26182231
Customer Care Contact Number – 01130611432/467/01126101240 or email - corporatealliance@oncquest.net
web: www.oncquest.net | e-mail: info@oncquest.net | Follow us on at OncquestLaboratories

Future of DIAGNOSIS is here

Offers most ADVANCED TECHNIQUES for laboratory testing

- Flowcytometry
- Haematology including Bone Marrow studies
- Real Time RT-PCR & Allele Specific PCRs
- Bi directional Gene Sequencing
- Cytogenetic & FISH
- Surgical Pathology including IHC
- Cytology
- General Pathology & Laboratory Medicine
Acknowledgement

The healthcare sector is one of the largest sectors in India and critical to people. In terms of mortality and incidence cervical cancer is one of the most common cancer where India contributes to almost 20–30% of the global burden. Various initiatives have been undertaken by the government in this regard, such as the national program on prevention and control of cervical cancer. However, early detection and cure of cervical cancer are still at a very nascent stage and there is an urgent need to create awareness on the burden of this disease.

As a representative organ of corporate India and considering cervical cancer as a national health issue, I am pleased to know that ASSOCHAM is organizing a summit on Comprehensive Prevention of “Cervical Cancer” on the occasion of National Cancer Awareness Day.

The primary objective of the summit is to create a platform for stakeholders to deliberate on expanding initiatives for prevention and cure of cervical cancer. One of the key outcomes expected from the summit is establishing relationships and collaboration with other organizations and institutions with similar missions and objectives.

I am thankful to our knowledge partner IMS Institute for Healthcare Informatics, India for bringing this informative study in time and putting all the facts and figures in place to enable its readers to have a quick glance of the prevailing scenario.

The ASSOCHAM Pharma & Healthcare team has been able to bring the initiative with the support of its stakeholders and the nodal agencies including MOHFW, ICMR and DBT, as we acknowledge them. The ASSOCHAM team with Dr. Om. S. Tyagi and his team members Sandeep Kochhar, Vipul Sharma, Shikha Singh and Nitesh Sinha have been proactive to launch the initiative in a short span of time. My best wishes to everyone for making this initiative a success.

D.S. Rawat
Secretary General, ASSOCHAM
Contents

ABBREVIATIONS ........................................................................................................................................................................................ 6

CHAPTER 1 - PRELUDE ........................................................................................................................................................................ 8

CHAPTER 2 - DISEASE BURDEN OF CERVICAL CANCER: WORLD AND INDIA ............................................................ 10

CHAPTER 3 - SCREENING AND PREVENTION OF CERVICAL CANCER IN INDIA .................................................. 17

CHAPTER 4 - DIAGNOSIS AND TREATMENT OF CERVICAL CANCER IN INDIA ....................................................... 24

CHAPTER 5 - CHALLENGES IN CERVICAL CANCER CONTROL IN INDIA .............................................................. 29

CHAPTER 6 - LESSONS FROM ACROSS THE GLOBE ................................................................................................. 32

CHAPTER 7 - THE WAY FORWARD ................................................................................................................................. 37

REFERENCES .................................................................................................................................................................................... 40
Abbreviations

ASR ................................................................. Age-standardized rate per lakh*
AAR ................................................................. Age-adjusted rate per 100,000
AJCC ............................................................... American Joint Cancer Commission
ASCO ............................................................. American Society of Clinical Oncology
BARC ............................................................ Bhabha Atomic Research Centre
CHC ............................................................... Community Health Centre
CIN ................................................................. Cervical Intra Epithelial Neoplasia
DNA .............................................................. Deoxyribonucleic acid
DALYs .......................................................... Disability Adjusted Life Years
FIGO ..................................................... Federation of International of Gynecologists and Obstetricians
GAVI ........................................................ Global Alliance for Vaccines and Immunisation
GoI ................................................................. Government of India
HPV .............................................................. Human Papilloma Virus
IARC .......................................................... International Agency for Research on Cancer
IEC .............................................................. Information, Education and Communication
IMRT .......................................................... Intensity Modulated Radiation Therapy
IPHS .......................................................... Indian Public Health Standards
LEEP ........................................................ Loop Electrical Excision Procedure
LMIC ........................................................ Low and Middle Income Countries
MR-Based ................................................ Magnetic Resonance Based
NCCN ........................................................ National Comprehensive Cancer Network
NCCP ........................................................ National Cancer Control Program
NHS ............................................................. National Health Scheme
PAP ............................................................. Papanicolaou
PBCR ........................................................ Population Based Cancer Registry
The number of new cases or deaths per 100,000 persons per year. An age-standardized rate is the rate that a population would have if it had a standard age structure. Standardization is necessary when comparing several populations that differ with respect to age because age has a powerful influence on the risk of cancer.
Prelude

With the change in lifestyles and demographic profiles, noncommunicable diseases are emerging to be important health problems that demand appropriate control before they assume epidemic proportion. One of these is the problem of cancer. In India, cervical cancer is a significant problem in terms of mortality and morbidity among females. Cervical cancer is a disease that can be prevented through both primary prevention and early detection using appropriate screening techniques. Several screening modalities are now available for early detection of cervical cancer and its precursor lesions. They all differ with regard to their test characteristics, feasibility and economic considerations. Cervical cancer alone accounts for more than 72,000 deaths every year in our country. The age-adjusted incidence and mortality of this malignancy is one of the highest relative to that of all other types of cancer in Indian women. India accounts for nearly one-third of global cervical cancer deaths. This is despite the fact that it is one of the few carcinomas that are preventable and curable to a large extent.

Cervical cancer has a very long pre-cancerous period, generally 10 to 15 years. It provides a considerable window of opportunity to detect it and treat it completely. Thus, early detection of the pre-malignant conditions allows the disease to be cured completely. If regular screening is made part of the routine check-up of all women who are susceptible, the onset of cancer can be detected and combated effectively. Despite this enormous disease burden, cervical cancer control has not been accorded the priority and urgency that it deserves. Government has taken the first step towards increasing policy makers’ support for effective prevention by the formulation of ‘National Cancer Control Program’ and by identification of ‘cervical cancer screening’ as one of the main goals of the state governments. A few state governments, such as Tamil Nadu, have initiated pilot screening programs in collaboration with bodies like the World Bank. Several NGOs such as the Indian Cancer Society, Global Marwari Charitable Foundation, GAVI, etc. have also contributed to improving disease control.

However, there is still no organized ‘national screening program’ for cervical cancer in India, except for a few initiatives by a handful of organizations. Awareness of women regarding risk factors and screening, diagnosis and treatment options remains dismally low. Even though all screening techniques such as Pap Smear, VIA, VILI, HPV DNA, etc. and treatment modalities are available in India, access to and affordability of these pose major challenges. These issues are further accentuated by the fact that cervical cancer prevalence is particularly high among women with low socio-economic status and rural women.
In the face of these constraints, ASSOCHAM has realized and recognized the need to focus on this critical issue that faces our healthcare sector today. The IMS Institute India, believes that there is an urgent need to strengthen the existing health systems in order to improve accessibility to primary and secondary prevention and screening measures.

It is our sincere hope that the summit organized by ASSOCHAM on ‘Comprehensive Prevention of Cervical Cancer in India’ will provide the right platform for relevant stakeholders to deliberate on expanding initiatives for prevention, early diagnosis and cure of this disease. We intend to establish relationships among organizations and institutions that have similar missions and objectives in the field of cervical cancer control. This paper is also a step in the same direction, and attempts to put into perspective the key aspects pertaining to disease burden, screening, prevention, diagnosis and treatment of cervical cancer; share learnings from other countries and our recommendations for effective control. We have sought and incorporated the opinions of various subject-matter and public-health experts in this report, and would like to thank them for their valuable contributions.
Disease Burden of Cervical Cancer: World and India

Cervical cancer is the third most common cancer in women across the world, and the seventh most common cancer overall, with an estimated 530,000 new cases in 2008. More than 85% of the global burden occurs in developing countries, where it accounts for 13% of all female cancers. This incidence is estimated to increase to 839,307 cases by 2020 (GLOBOCAN, 2008).

High-risk regions are Eastern and Western Africa (Age-standardized rate per lakh (ASR) greater than 30 per 100,000), Southern Africa (26.8 per 100,000), South-Central Asia (24.6 per 100,000), South America and Middle Africa (23.9 and 23.0 per 100,000 respectively).

Rates are lowest in Western Asia, Northern America and Australia/New Zealand (ASR less than 6 per 100,000). Overall, the global mortality ratio is 52%, where cervical cancer was responsible for 275,000 deaths in 2008, about 88% of which occurred in developing countries: 53,000 in Africa; 31,700 in Latin America and the Caribbean; and 159,800 in Asia.


Source: Globocan 2008 (IARC)
Indian Scenario

India has a disproportionately high burden of cervical cancer. As of 2008, the one-year prevalence of cervical cancer in India was 100,488 cases and the five-year prevalence was 338,010 cases, accounting for approximately 22% of global prevalence, and 75% of total prevalence in South Central Asia (GLOBOCAN 2008 database, IARC).

In India, the age-adjusted incidence (27.0 per 100,000 women; 134,420 incident cases) and mortality (15.2 per 100,000 women; 72,825 cases) of cervical cancer is the highest relative to that of all other types of cancer, and is higher than the average for the South Central Asia region (GLOBOCAN 2008 database, IARC).

India accounts for nearly one-third of global cervical cancer deaths (WHO 2009, GLOBOCAN 2008, IARC). Among women, it is the leading cause of cancer mortality in the country, accounting for 12% of all cancer deaths (GLOBOCAN 2008, IARC). According to IARC estimates, mortality from cervical cancer is expected to increase from 72,825 deaths in 2008 to 101,362 deaths by 2020.

Estimated age-standardized incidence and mortality rates in India (2008): both sexes

![Graph showing age-standardized incidence and mortality rates for various cancers in India](image)

Source: Globocan 2008 (IARC)
There is a wide regional variation witnessed in disease burden. Of all the population-based cancer registries in India (PBCRs), the age-adjusted incidence has been the highest in Chennai. However, this registry has also witnessed the most statistically significant decline in age-adjusted rate per 100,000 people (AARs) over time. There is a particularly high incidence rate in the North-Eastern districts of Tamil Nadu (Thiruvallur, Villupuram, Pondicherry, Cuddalore), as well as in two districts in the North-East (Aizwal, Mamit) (National Cancer Registry Programme).
The economic burden of cervical cancer is also enormous. It causes loss of productive life due to early death and prolonged disability. At an age-standardized rate of 466 disability adjusted life years (DALYs) per 100,000 population, cervical cancer accounts for 27% of global cervical cancer DALYs and 25% of total cancer DALYs in Indian women (GLOBOCAN 2008, IARC).

The Years of Life Lost (YLL) due to cervical cancer were 428 per 100,000 population in 2008, being among the highest in the world, and greater than the YLLs caused by any other cancer in India. Additionally, the high medical costs that are incurred by families due to cervical cancer (especially since most cases are diagnosed at advanced stages when treatment is costly but prognosis poor), further impoverish individuals and communities (Bishop et al, 1996).

The disability-adjusted life year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill health, disability or early death.
Cervical cancer risk factors in India/high disease burden population groups in India

Cervical cancer is one of the few malignancies where the role of viral infections has been clearly established. Infection with human Papilloma Virus (HPV) has been seen in nearly 95% of patients with cervical cancer. Multiple HPV strains have been proved to be causative agents; HPV-16 and 18 being the most common strains accounting for more than 90% of HPV-related cervical cancer cases (David Forman et. al., 2012).

In India, prevalence of HPV 16/18 in invasive cervical cancer cases is 95% (95% CI 9.5, 85.1) (Neerja Bhatla et. al., 2008). A case-control study conducted in Chennai, India, found an almost 500-fold increase in the odds of having cervical carcinoma in cases with any HPV infection relative to controls with no HPV infection (Francheschi et al, 2003).

Source: WHO/IARC Information Centre on Human Papilloma Virus (HPV) and Cervical Cancer

---

**Burden of HPV DNA 16 or 18 in women with and without cervical cancer by world region**

**HPV 16 or 18 in women with normal cytology**

- [1.3 - 2.6]
- [2.6 - 3.2]
- [3.2 - 4.5]
- [4.5 - 6.8]
- [6.8 - 9.3]
- Not available

**HPV prevalence (%) in quintiles**

Source: WHO/IARC Information Centre on Human Papilloma Virus (HPV) and Cervical Cancer
The long-time frame between initial infection and evident disease indicates that other exogenous or endogenous cofactors, such as sexual habits, reproductive factors, other sexually transmitted diseases, smoking, nutritional deficiencies and genetic susceptibility, acting in conjunction with HPV may be necessary for disease progression (Ferrera et al., 2000; Sellors and Sankaranarayanan, 2003; Stewart and Kleihues, 2003).

The prevalence and burden of this disease has been found to be much higher among women of low socio-economic status (SES), as well as among rural women in India (Vallikad, 2006; Kurkue, and Yeole, 2006). The primary reasons for this are lack of access to screening and health services, and lack of awareness of the risk factors of cervical cancer (Kaku et al, 2008). Moreover, due to difficulties of access and affordability, compliance to, and follow up of, treatment is much worse for women of low SES, leading to further morbidity and mortality from the disease (Laedtke and Dignan, 1992).

### Risk factors associated with cervical cancer in India

- **Demographic**
  - Age
  - Marital status
  - Education
  - Socio-economic status

- **Infectious**
  - HPV infection
  - Infection with other STDs such as HIV, Herpes, Chlamydia, gonorrhoea, syphilis

- **Reproductive**
  - Age at First Pregnancy
  - Number of pregnancies
  - Multiple partners
  - Oral contraceptive use

“Cervical cancer is found most commonly in women in the age group of 35–60 years, and to those belonging in the lower socio-economic group. These women (lower SES) are also the ones least likely to attend awareness sessions and come forth for screening/treatment.”

*Dr. Sharmila Pimple, Professor of Preventive Oncology, Tata Memorial Hospital*
Beat Cancer with the best. Apollo Hospitals, Delhi.

Best of clinical expertise and cutting-edge technology in Cancer care.

Cancer Specialist teams and the latest technology work together at Apollo Hospitals to make sure you get precise treatment. We have the world’s first PET SUITE for diagnosis, comprising of South Asia’s first PET MRI and PET CT. Post a diagnosis, our tumor board will evaluate your case and recommend the best course of treatment. In our treatment we offer Targeted Immunotherapy, Novalis Tx and Lineac in radiation therapy and robotic surgery for precision procedures. All this with the single minded aim to give you the best in Cancer care.

Cancer screening | Medical therapy | Radiation therapy | Surgical therapy | Robotic Surgery | Rehabilitation | Health@Home

Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi.
Phone: +91-11-2987 1090 / 91
Mobile: +91-9650020391

Follow us on TheApolloHospitals HospitalsApollo apollohospitalsindia

www.apollohospdelhi.com
Screening and Prevention of Cervical Cancer in India

Cervical cancer is one of the few cancers where screening programs have made significant impact on controlling prevalence of disease (IARC). The main principle of cervical screening procedures is to identify pre-malignant conditions, commonly labeled as Cervical Intra-epithelial Neoplasia (CIN). Multiple screening procedures are available that can be classified into cytology based, visual examination based and others (an overview of prevention and early detection of cervical cancers, IJMPO).

For emerging countries, especially India, one of the commonly promoted techniques is visual inspection with acetic acid (VIA), which involves applying acetic acid on the surface of cervix and then examining for changes. As per literature, VIA has similar sensitivity as compared to Pap cytology test (K. Syrjänen et al 2005, Shuchi Consul et al 2012). A recent study presented at American Society of Clinical Oncology (ASCO) from Tata Memorial Hospital (TMH) also demonstrated significant role of VIA as a screening tool in an Indian scenario.

The risk of mortality was reduced by 30% in screened population. As per the Federation of International Gynecologists and Obstetricians (FIGO) guidelines also, a single VIA testing in the life of a female has potential to reduce risk of cancer by a third (Neerja Bhatla et al 2009). VIA technique has been favored for emerging countries in view of the following advantages:

1. Cost-effective
2. Can be performed by a paramedic
3. Doesn’t require lab support
4. On-the-spot results
5. High sensitivity and low false negative
Cervical screening in India

The National Cancer Control Program has developed recommendations for cervical screening in India in 2006, which incorporates VIA as a screening technique.

From an infrastructure perspective, there have been recommendations for conducting IEC programs and training of healthcare workers at different healthcare levels. Recent Indian public health standards (IPHS) guidelines recommend infrastructure for screening of cervical cancer at different tiers of healthcare system in India.

Source: NCCP
Although recommendations have been proposed by the National Cancer Control Program (NCCP), there is no established national screening program that is focused on identifying women with pre-cancerous/cancerous lesions. However, there have been two examples of screening programs implemented through state government initiatives. One of the most talked about and successful models has been Tamil Nadu model, where state Ministry of Health collaborated with the World Bank for cervical screening programs.

“Would recommend VIA as the preferred screening procedure in the Indian settings, due to its low cost and ease of conducting the test.”

Oncologist, Private Hospital

“For screening, VIA is more cost effective & simpler, and hence better suited to India as compared to pap-smear test.”

Dr. Purvish Parikh, National Managing Committee member at Indian Cancer Society; ex-Professor and Head of Medical Oncology, Tata Memorial Hospital
Tamil Nadu screening program

This was a pilot program conducted in two districts of Tamil Nadu. The program was done by Tamilnadu Health System Project (TNHSP), a collaboration of Tamil Nadu Government and World Bank. The screening program was able to demonstrate the feasibility of creating awareness and VIA/VIAM (Visual inspection with acetic acid under magnification) in detecting cervical cancer at a low cost of Rs 102/screening case.

Based on success achieved in the pilot project, this strategy is being rolled-out in all districts of Tamil Nadu.

Comparison of Indian and global screening guidelines

<table>
<thead>
<tr>
<th>Guidelines</th>
<th>Age- Group for Screening</th>
<th>Age of Initiation of Test and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIGO</td>
<td>25-60 years</td>
<td>Age of Initiation: 21-25 or 3 yrs post initiation of sexual activity. Frequency: At least once every 5 years. Age of Initiation: 30 years.</td>
</tr>
<tr>
<td>USA</td>
<td>21-65 years</td>
<td>Age of Initiation: 21 years. Frequency: Every 3 years till 30 years of age and then every 5 years. Age of Initiation: 30 years. Frequency: Every 5 years.</td>
</tr>
<tr>
<td>India</td>
<td>30-59 years</td>
<td>Not included as part of program. Where facilities available 5 yearly evaluation is recommended.</td>
</tr>
</tbody>
</table>
Prevention of cervical cancer

There is a serious lack of awareness not only in the general population but also in the medical fraternity and policy-makers in India. Women’s perceptions regarding cervical cancer screening are also a problem. A small demonstration program offering free cervical cancer screening in the community attracted only 60% of the target population for testing. Interview of the 40% no-shows revealed that the main reason given was that a test was not needed because the women had no symptoms. That was followed by the burden of housework and the absence of permission from the husband or in-laws. India thus needs a national program, but the approach must be realistic. What can be afforded at present is probably a low-volume screening program, a once-in-a-lifetime test. A human papilloma virus (HPV)-based test would probably be best because of its sensitivity. Two HPV vaccines have been approved, but their high cost restricts their use to wealthier citizens. Their inclusion in a national program within the next five years cannot be expected, and a huge number of women in need will go unscreened and untreated. A questionnaire survey of the attitudes of the wealthy urban and educated class in the Calcutta area revealed that even in that population nearly 70% of the men and women had never heard of cervical cancer. After reading a fact sheet, nearly 75% of both sexes agreed to having their daughters vaccinated. Nearly half of parents who refused the vaccine for their daughters said the reason was that the vaccine was new and its safety unknown.

Primary prevention of cervical cancer became reality with the launch of two HPV vaccines, Gardasil (Merck) and Cervarix (GSK). These vaccines provide protection to healthy females from developing HPV infections and consequently cervical pre-cancerous/cancerous lesions.

Key features of HPV vaccines

<table>
<thead>
<tr>
<th></th>
<th>Quadrivalent Vaccine</th>
<th>BiValent Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV strains covered</td>
<td>6, 11, 16, 18</td>
<td>16, 18</td>
</tr>
<tr>
<td>Number of doses</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Schedule</td>
<td>0 month, 2 months, 6 months</td>
<td>0 month, 1 month, 6 months</td>
</tr>
</tbody>
</table>

Although both vaccines do not target all the cancerous HPV strains, they do cover nearly 80-85% of causative strains.
Guidelines for HPV vaccination

WHO issued a position statement in 2009 recommending that routine HPV vaccination of females be included in national immunization programs, provided that:

1. Cervical cancer and/or HPV-related diseases constitute a public health priority;
2. Vaccine introduction is programmatically feasible;
3. Sustainable financing can be secured;
4. Cost-effectiveness of vaccination strategies in the country or region is considered.

Preferably, HPV vaccines should be introduced as part of a coordinated strategy to prevent cervical cancer and should not undermine or divert funding from effective cervical cancer screening programs (WHO Weekly Epidemiological Record, 2009). The appropriate age of vaccination is before the onset of sexual debut, but it differs by country to country.

In order to further limit the transmission of HPV infection, countries do recommend HPV vaccination for males as well.

Guidelines for HPV vaccination in selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>HPV vaccination recommended for</td>
</tr>
<tr>
<td></td>
<td>Girls: 9-26 years</td>
</tr>
<tr>
<td></td>
<td>Boys: 9-15 years</td>
</tr>
<tr>
<td></td>
<td>School-based administration</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Girls: 12-13 years as part of NHS vaccination programme</td>
</tr>
<tr>
<td>USA</td>
<td>Girls: 11-12 years</td>
</tr>
<tr>
<td>India</td>
<td>Girls: 10-12 years (Recommended by IAP, but not included in</td>
</tr>
<tr>
<td></td>
<td>the National Immunization program)</td>
</tr>
</tbody>
</table>


Uptake of HPV vaccines in India has been extremely slow in view of safety issues observed in demonstration studies in Indian population.
Symptomatology and diagnosis of cervical cancer

Symptomatology
Symptoms of the cervical cancer patients differ by the stage of disease. Early stage disease is usually asymptomatic and as the disease progresses symptoms become evident based on involvement of nearby and distant organs.

Common symptoms of cervical cancer

<table>
<thead>
<tr>
<th>Early Disease</th>
<th>Local Disease</th>
<th>Advanced &amp; Metastatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>• Thin watery / bloody vaginal discharge</td>
<td>• Leg edema</td>
</tr>
<tr>
<td></td>
<td>• Abnormal bleeding</td>
<td>• Urinary difficulties</td>
</tr>
<tr>
<td></td>
<td>• Intermenstrual</td>
<td>• Blood in urine</td>
</tr>
<tr>
<td></td>
<td>• Post Coital</td>
<td>• Pain on Urination</td>
</tr>
<tr>
<td></td>
<td>• Peri and Post menopausal</td>
<td>• Bowel symptoms</td>
</tr>
<tr>
<td></td>
<td>• Blood stained foul vaginal discharge</td>
<td>• Bleeding in stools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Constipation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hemorrhoids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Breathing difficulties</td>
</tr>
</tbody>
</table>
Diagnosis
Diagnosis of cervical cancer is performed through clinical examination, which is confirmed by pathological examination of tissue obtained through biopsy.

Diagnostic investigations for cervical cancer

- Per Vaginum Examination
- Colposcopy Examination
- Endocervical curettage
- LEEP
- Colposcopic
- Cystoscopy
- Colonoscopy
- Chest-X-Ray

Source: Cecelia H Boardman, Kirk 2013
Treatment of cervical cancer

Treatment of cervical cancer involves a team effort of gynecologist, radiation oncologist and medical oncologist. Once the diagnosis of the patient is confirmed, the disease is staged and treatment is decided based on the stage of the disease. The staging of disease is based on the American Joint Committee on Cancer (AJCC) recommendations, which take into consideration the size of the tumor, status of local nodes and spread of disease to other parts of the body.

Main treatment modalities used for the treatment are surgery and radiation therapies. Surgery is preferred in the early stages of disease.

Common recommended surgeries

1. **Cone biopsy**: This involves removing a cone of cervical tissue with tumor and margin, usually preferred for early diseases, with no lymph nodes involvement and in pre-menopausal women.

2. **Radical trachelectomy**: This involves removal of the cervix and nearby lymph nodes, and is preferred in early-stage disease, and young women who want to retain their fertility.

3. **Hysterectomy**: This involves complete removal of the uterus, cervix and lymph nodes, and is preferred in post-menopausal patients.
Main treatment modalities used for the treatment are surgery and radiation therapies. Surgery is preferred in the early stages of disease.

**Common radiation techniques**

1. **External Beam Radiation:** This involves giving radiation from outside, whereby radiation beams are focused on the cervix and a set dose is administered to the patient. This technique is usually preferred in stage II-III and is combined with chemotherapy administration.

2. **Brachytherapy:** This involves applying the source of radiation within the cervical cavity and directly radiating the tumor tissue.

Radiation therapy plays a dominant role in the treatment of cervical cancer. However such treatments are often associated with morbidities, due to delivery of radiation to the surrounding organs. Recently there have been technological advances to limit the dose to the surrounding tissues such as image-guided brachytherapy, Magnetic resonance (MR) -based brachytherapy, intensity modulated radiation therapy, etc.

> “The recent advances have been in terms of technology whereby we have started MR based brachytherapy.”

*Dr. Sapna Nangia, Apollo Hospital*
Challenges in Cervical Cancer Control in India

Although India does have the facilities for screening, treatment and prevention, there are challenges for implementation of these at the ground level.

Challenges for screening of cervical cancer

Awareness and beliefs
Based on reports and recommendations, VIA has been incorporated in the national screening program. However, key challenge in the implementation of the screening program is the lack of awareness in the providers i.e. the healthcare workers and the targeted population. A study in premier colleges of Kolkata showed that only 11% were aware of pap smear as a screening modality and only 15-20% knew about the risk factors for cervical cancer (A Saha et al 2010).

From a provider perspective, a study in nursing staff from a referral and teaching institute in rural India showed limited awareness about the risk factors for cervical cancer, and only half of respondents knew that a pap smear can detect pre-cancerous lesions and only 34% knew about VIA as a screening technique. On collating responses to all questions, only 24% could be considered as having adequate knowledge.

Another challenge for screening is in the terms of availability. Although IPHS (Indian Public Health Standards) guidelines and cancer screening program recommend availability of pap smear/VIA facilities at Primary Health Centers (PHC) levels, PHC has been found to be highly under resourced for screening purposes. The unavailability of infrastructure at PHC forces willing women to travel to district hospitals, thus presenting an accessibility challenge. (Shashank Shekhar el al 2013)

Availability
VIA has been recommended by the NCCP guidelines. However the updated IPHS guidelines mention pap smear as a desirable investigation at PHC level. Currently the infrastructure for carrying out any of these investigations is inadequate at PHC and community health center (CHC) level. In addition, post-screening diagnostic facilities are available at the district hospitals, which again poses an accessibility problem for the rural population of India.
Apart from infrastructure, availability of trained manpower is another issue. As can be inferred from the knowledge of healthcare workers in a tertiary teaching centre study, where only \(\frac{1}{4}\) were deemed to have had adequate knowledge about cervical cancer screening, the situation is expected to be worse at the PHC and CHC levels.

There is a huge gap in terms of awareness regarding the disease in the general population; they lack knowledge about symptoms, whom to approach and the risk factors."

Dr. Kishore Singh, Government Hospital, Delhi

“A major issue in India is that we do not have enough qualified cytologists and inadequate diagnostic infrastructure. In addition, wait time at government facilities is an issue, which dissuades screening.”

Dr. Purvish Parikh, National Managing Committee member at Indian Cancer Society; ex-Professor and Head of Medical Oncology, Tata Memorial Hospital

Challenges for prevention of cervical cancer

**Awareness**
HPV vaccines have been available in the market since 2009. However the awareness regarding presence of such vaccines is extremely low in India. A study from a tertiary hospital showed that only 25% of nursing staff knew about HPV vaccines (Shashank Shekhar el al 2013). This number dropped to 14% (Hema Divaker 2012) in a study evaluating knowledge of vaccines in the urban population. These statistics, although from selected centers, clearly reflect the paucity of knowledge about preventive approaches for cervical cancer in the Indian population.

**Affordability and Accessibility**
Currently a single cycle of HPV vaccine costs around Rs 3000, which is an unaffordable cost for the majority of the Indian population. As HPV vaccines are yet to be incorporated under the national programs, their availability is restricted to private hospitals or big government institutions, making access to a vaccine a big challenge.
Challenges for diagnosis and treatment of cervical cancer

**Awareness**
Early diagnosis involves awareness of symptoms by patients and knowledge of signs by healthcare workers. As per studies, there is a large gap in awareness about disease among patients and healthcare workers in rural settings (Shashank Shekhar et al 2013, Hema Divaker 2012). However, awareness about disease was found to be high in a study from Medical College in Ahmedabad, where ~70% had knowledge about cervical cancer, and 70–90% knew about symptoms of cervical cancer (V. Shah et al 2012).

**Availability**
Cervical cancer diagnosis requires laboratory support and the presence of a skilled pathologist and gynecologist. As per the current IPHS guidelines, these facilities are available at the district hospital level or above, which presents an accessibility challenge for the suspected cases. In addition to facilities, the unavailability of trained medical personnel further aggravates the issue. As per 2005 statistics, there were 13.8 healthcare workforce/10,000 patients, versus the recommended 22/10,000 patients. The ratio further drops in the rural parts of the country (Krishna D. Rao et. al. 2012).

In terms of infrastructure, radiation treatment is one of the major treatment modalities for cervical cancer. As per BARC (the governing body for RT machines in India), there are ~300 machines in India compared to the 1,000 that are required as per WHO guidelines.

**Affordability**
Currently the treatment of cervical cancer costs Rs 1-2 Lakh in a private set-up and around 10,000–20,000 in a government set-up. These are exorbitant costs for the majority of the Indian population. With the majority of payment in India being out of pocket, availing such costly treatments is impossible for the majority.

There are limited treatment facilities in India, and government centers are over burdened with patients which leads to long waiting times, leading to progression of disease.

*Dr. Kishore Singh, Government Hospital*
Lessons from across the Globe

Addressing the outlined challenges requires a context-specific strategy encompassing screening, diagnosis, prevention and treatment aspects of the disease. For this strategy to be effective, it is imperative to study and incorporate the lessons learned from implementing similar strategic programs/initiatives in high- as well as middle- and low-income countries across the world.

Over the past several decades, there has been a steady decline in cervical cancer incidence and mortality rates in high-income countries. Effective early screening and treatment technologies have driven these reductions, allowing clinicians to detect and remove cervical anomalies before invasive cancer develops. These efforts have been complemented by public education, clinician training, and strong health information systems designed to capture data and assess the impact of programs and policies (CCA Report card 2012: Progress in Cervical Cancer Prevention).

However, the techniques and technologies that have been successful in the developed world have not necessarily worked as well in resource-constrained low- and middle-income countries (LMIC).

Of all the options available, one that has been most clearly established across the world is that health education and promotion should be an integral part of any national cervical cancer control program (WHO, 2006). The program should include an awareness component (for women as well as caregivers), aspects of behavior modification and counseling. A recent KAP (knowledge, attitude and perception) study revealed low uptake of pap smear test, low knowledge level on prevention of cervical cancer and risk factors, and negative perception towards screening in LMICs such as South Africa, Uganda, Ethiopia and India. The rural-urban divide was also more prominent in these countries as compared to high-income countries (Sreejata Raychaudhuri, Sukanta Mandal). This lack of awareness can be partly attributed to the low success of cervical cancer control programs in LMICs.

Screening has also been advocated as a critical aspect of all cervical cancer control programs across the world. However, there is debate over determining the most appropriate screening technique for a particular country and socio-economic setting.

Pap test or smear has been effectively in use in high-income settings despite its sub-optimal performance in correctly identifying women with pre-cancerous lesions. This challenge has been mediated by frequent testing, strong systems to recall women with abnormal results and high rates of follow-up among women who need to return to a clinic for treatment.
In low- and middle-income settings, however, the pap smear has performed less ideally—as the confluence of poor test performance, limited recall systems, high cost and challenges preventing many women from traveling repeatedly to clinics has affected screening systems. New alternatives such as VIA, and HPV DNA test are now increasingly being used in conjunction with or as replacement to pap in many LMICs (CCA Report card 2012: Progress in Cervical Cancer Prevention).

**Introduction of Visual Inspection (VIA) for Cervical Cancer Screening**

<table>
<thead>
<tr>
<th>National Programs</th>
<th>Pilot Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Angola</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Bangladesh</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Botswana</td>
</tr>
<tr>
<td>China</td>
<td>Burkina Faso</td>
</tr>
<tr>
<td>Colombia</td>
<td>Cameroon</td>
</tr>
<tr>
<td>El Salvador</td>
<td>Cote d’Ivoire</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Ethiopia</td>
</tr>
<tr>
<td>Guyana</td>
<td>Ghana</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Grenada</td>
</tr>
<tr>
<td>Kenya</td>
<td>Guinea</td>
</tr>
<tr>
<td>Malawi</td>
<td>Haiti</td>
</tr>
<tr>
<td>Morocco</td>
<td>Honduras</td>
</tr>
<tr>
<td>Mozambique</td>
<td>India</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>Lesotho</td>
</tr>
<tr>
<td>Panama</td>
<td>Madagascar</td>
</tr>
<tr>
<td>Paraguay</td>
<td>Mali</td>
</tr>
<tr>
<td>Peru</td>
<td>Myanmar</td>
</tr>
<tr>
<td>Philippines</td>
<td>Namibia</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Nepal</td>
</tr>
<tr>
<td>Suriname</td>
<td>Nigeria</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Republic of Congo</td>
</tr>
<tr>
<td>Thailand</td>
<td>South Africa</td>
</tr>
<tr>
<td>Uganda</td>
<td>St. Lucia</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Sudan</td>
</tr>
<tr>
<td></td>
<td>Turkey</td>
</tr>
<tr>
<td></td>
<td>Vanuatu</td>
</tr>
<tr>
<td></td>
<td>Zambia</td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
</tr>
</tbody>
</table>

**Introduction of HPV DNA Testing for Cervical Cancer Screening**

<table>
<thead>
<tr>
<th>National Programs</th>
<th>Pilot Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>China</td>
</tr>
<tr>
<td>United States</td>
<td>Colombia</td>
</tr>
<tr>
<td></td>
<td>El Salvador</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
</tr>
<tr>
<td></td>
<td>India</td>
</tr>
<tr>
<td></td>
<td>Italy</td>
</tr>
<tr>
<td></td>
<td>Nicaragua</td>
</tr>
<tr>
<td></td>
<td>Paraguay</td>
</tr>
<tr>
<td></td>
<td>Peru</td>
</tr>
<tr>
<td></td>
<td>Republic of Georgia</td>
</tr>
<tr>
<td></td>
<td>Rwanda</td>
</tr>
<tr>
<td></td>
<td>Spain</td>
</tr>
<tr>
<td></td>
<td>Uganda</td>
</tr>
</tbody>
</table>

Sources: Cervical Cancer Action communication with PATH (September 2012), Jhpiego (September 2012), the Australian Cervical Cancer Foundation (November 2010), Grounds for Health (October 2010), Basic Health International (October 2010) and the Pan American Health Organization (September 2012)

National Programs: VIA/HPV DNA testing in the national screening norms and available on a limited or universal basis through the public sector Pilot Programs: VIA/HPV DNA testing available through pilot or demonstration projects organized by the Ministry of Health or NGO partners.
Countries with successful national cervical cancer screening programs (representative)

<table>
<thead>
<tr>
<th>Country</th>
<th>Commencement of National Cervical Cancer Screening Program</th>
<th>Technique Used</th>
<th>Target Population Group</th>
<th>Screening Coverage</th>
<th>Screening Outcomes</th>
</tr>
</thead>
</table>
| Korea   | 1989 (for health insurance) 1999 (for Medicaid women)     | Pap smear      | Women aged 30 and above | ~80%              | • Decrease in Invasive Cervical Cancer  
• Increase in CIS (carcinoma in situ) cases |
| Japan   | 1982                                                      | Cytology based tests | 24% | Reduction in incidence and mortality by 70% |
| Australia| 1991                                                     | Pap smear       | Women aged 18 to 70 years | | Reduction in age standardized mortality from 4 deaths per 100,000 women in 1991 to 1.9 in 2006 |
| UK      | 1988                                                      | Liquid-based cytology (2003 onwards) | women | Reduction in incidence and mortality rate by 60-70% |


The third key component in cervical cancer control is prophylactic vaccination against HPV. Australia, Canada, New Zealand, United Kingdom and the United States were among the first countries to introduce HPV vaccine in 2007 and early 2008. Even though they have robust screening and early treatment programs in place, the number of high-income countries establishing HPV vaccine programs continues to grow, as vaccination is expected to further reduce mortality and minimize morbidity and costs related to treatment.

As of September 2012, there were 51 national public sector HPV immunization programs and 26 pilot programs globally.
## Introduction of HPV Vaccine for Cervical Cancer Prevention

<table>
<thead>
<tr>
<th>National Programs</th>
<th>Pilot Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Samoa</td>
<td>Luxembourg</td>
</tr>
<tr>
<td>Argentina</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Australia</td>
<td>Marshall Islands</td>
</tr>
<tr>
<td>Austria</td>
<td>Mexico</td>
</tr>
<tr>
<td>Belgium</td>
<td>Micronesia</td>
</tr>
<tr>
<td>Bermuda</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Bhutan</td>
<td>New Caledonia</td>
</tr>
<tr>
<td>Brunei</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Canada</td>
<td>Niue</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>Norway</td>
</tr>
<tr>
<td>Cook Islands</td>
<td>Northern Mariana</td>
</tr>
<tr>
<td>Colombia</td>
<td>Palau</td>
</tr>
<tr>
<td>Denmark</td>
<td>Panama</td>
</tr>
<tr>
<td>Fiji</td>
<td>Peru</td>
</tr>
<tr>
<td>France</td>
<td>Portugal</td>
</tr>
<tr>
<td>French Polynesia</td>
<td>Republic of Macedonia</td>
</tr>
<tr>
<td>Germany</td>
<td>Romania</td>
</tr>
<tr>
<td>Greece</td>
<td>Rwanda</td>
</tr>
<tr>
<td>Guam</td>
<td>San Marino</td>
</tr>
<tr>
<td>Ireland</td>
<td>Singapore</td>
</tr>
<tr>
<td>Italy</td>
<td>Slovenia</td>
</tr>
<tr>
<td>Japan</td>
<td>Spain</td>
</tr>
<tr>
<td>Latvia</td>
<td>Sweden</td>
</tr>
<tr>
<td>Lesotho</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Suriname</td>
<td>Uganda</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Vietnam</td>
</tr>
<tr>
<td>United States</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Cervical Cancer Action communication with PATH (September 2012), Jhpiego (September 2012), the Australian Cervical Cancer Foundation (November 2010), Grounds for Health (October 2010), Basic Health International (October 2010) and the Pan American Health Organization (September 2012).

National Programs: HPV vaccine in the national norms and available on a limited or universal basis through the public sector.

Pilot Programs: HPV vaccine available through pilot or demonstration projects organized by the Ministry of Health or NGO partners.
Among middle-income countries, Mexico was one of the earliest to introduce a public sector HPV immunization program. Also in 2008, Panama became the first middle-income country to provide universal access to HPV vaccination. The availability of HPV vaccine through the Pan American Health Organization’s EPI Revolving Fund gives participating governments in Latin America and the Caribbean access to the HPV vaccine at significantly reduced prices (CCA Report card 2012: Progress in Cervical Cancer Prevention).

Despite the efficacy and availability of HPV vaccines, a number of barriers have limited their uptake in low-resource settings, including: cost, difficulty in effectively reaching HPV vaccine target populations, competition for immunization resources as vaccines against other diseases are also being introduced, cultural issues related to the fact that HPV infection is a sexually transmitted disease, limited awareness of cervical cancer and its relationship to HPV infection, concerns about HPV vaccination with respect to safety and future fertility, negative experiences with previous vaccinations for other diseases and political factors (Joe Ladner et. al. 2012).

### Countries with successful HPV vaccination programs (representative)

<table>
<thead>
<tr>
<th>Country</th>
<th>Program</th>
<th>Funding</th>
<th>Current Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>HPV Vaccination recommended for Girls: 9-26 years Boys: 9-15 years School based administration</td>
<td>Government funded for girls</td>
<td>80% in girls</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Girls: 12-13 years as part of NHS vaccination programme</td>
<td>Government funded</td>
<td>90% for dose 1 and 72% for all 3 doses</td>
</tr>
<tr>
<td>USA</td>
<td>Girls: 11-12 years</td>
<td>Insurance based, not part of vaccination program</td>
<td>53% for &gt;1 dose</td>
</tr>
<tr>
<td>Panama</td>
<td>Girls: 10 years, part of National Immunization Program</td>
<td>Government funded</td>
<td>89% for 1 dose in 2009 67% for 3 dose in 2010</td>
</tr>
</tbody>
</table>

The Way Forward

Recommendations

Based on the learning from existing cervical cancer initiatives, research studies in the field, available literature and discussions with subject matter experts, we believe that the foremost focus for controlling the burden of cervical cancer in India should be on strengthening the screening initiatives.

Recommended priority level for cervical cancer control in India

<table>
<thead>
<tr>
<th>Screening</th>
<th>Prevention</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness, Infrastructure, Manpower, Policy and planning</td>
<td>HPV Vaccination subsidization</td>
<td>Low capital-intensive procedures Access to quality healthcare</td>
</tr>
</tbody>
</table>

Screening

VIA should be promoted as the preferred screening technique, in line with the National Cervical Cancer Screening Guidelines framed by the Government of India (GoI). This should be carried out by strengthening policy framework as well as through awareness programs, infrastructure availability and manpower credentials.

Recommended focus areas for strengthening screening initiatives in India

- According a high priority status to cervical cancer
- Implementing robust monitoring policy for suspected/diagnosed cases
- Increasing geographical coverage of cancer registries
- Engaging local level panchayats for mass awareness
- Conducting ‘IEC’ programs at sub-centre level
- Organizing knowledge and orientation programs for females visiting healthcare centers
- Availability of VIA technique at PHC level
- Facility for ‘See and Treat’ at CHC level
- Pap smear facility at the level of district hospitals
- Orientation of healthcare providers regarding risk factors and disease presentation
- Training ASHAs/ANMs and FHWs in VIA technique
- Apprising FHWs of appropriate centres of referrals in case of suspected patients
THE WAY FORWARD

“There is an acute lack of awareness amongst women regarding the risk factors as well as available screening options for cervical cancer. If we tackle these two issues properly, there will be a massive reduction in disease burden. Public facilities are already over-burdened and private facilities do not focus on cervical cancer screening.”

*Ms. Jyotsna Govil, Indian Cancer Society*

Prevention
If the HPV vaccination pilot programs being run in India prove to be successful in terms of efficacy and safety, these vaccines can be used as an option to complement the screening initiatives. However, it can make a significant impact only if affordability of the vaccine is improved by public-private partnerships and seeking support from organizations such as GAVI alliance.

- Awareness programs should be launched as part of the school health programs among adolescent boys as well as girls.
- Effective information, education and communication (IEC) and community reach out programs should be launched.
- Opportunistic screening
- Large-scale screening in camp mode
- Celebrity brand ambassador for awareness and prevention
- TV/radio programs
- Public private partnership in early diagnosis and quality treatment
- Enhanced awareness on genital hygiene

Treatment
For a resource-poor country like India, it is essential to diagnose the majority of cases at an early stage so that cost-effective treatment techniques such as cryotherapy, and loop electrical excision procedure (LEEP) can be deployed as the preferred treatment mode at the primary and secondary care level. Dependence on radiotherapy and advanced surgical procedures is not ideal as the setting up of these facilities at tertiary level requires capital-intensive infrastructure, high-end technology, highly trained manpower, regulatory clearances and a high gestation period.

“VIA is a highly appropriate technique for screening in India, and should be taken up on a mass scale.”

*Dr. Damodar Bachani, Deputy Commissioner (NCD), MoHFW*

“Even if we can get a patient to undergo the screening procedure once in her lifetime, we drastically reduce the burden of disease”

*Dr. Sapna Nangia, Private Hospital*
“NGOs and PPP should be given a bigger role in assisting the government address the challenge posed by the disease.”

*Dr. Purvish Parikh, National Managing Committee member at Indian Cancer Society; ex-Professor and Head of Medical Oncology, Tata Memorial Hospital*

“Increasing awareness to ensure that all women (between 35–60 years of age) are at least tested once in a lifetime is a needed initiative, for which there is need to increase facilities for screening, and diagnostic facilities at District and CHC levels.”

*Dr. Sharmila Pimple, Professor of Preventive Oncology, Tata Memorial Hospital*
References

• A Saha, A Nag Chaudhury, P Bhowmik, R Chatterjee. Awareness of Cervical Cancer Among Female Students of Premier Colleges in Kolkata, India. 2010;11:1085-1090


• Divakar Hema, Knowledge and Awareness about Preventive Health Seeking Behavior and Acceptability of Cervical Cancer Vaccine in Urban Women in Comparison with School Students. 2012;4:47-53


• GLOBOCAN 2008, IARC

• Human papillomavirus and HPV vaccines: technical information for policy-makers and health professionals, World Health Organization 2007

• Joël Ladner, Marie-Hélène Besson, Rachel Hampshire, Lisa Tapert, Mike Chirenje and Joseph Saba. Assessment of eight HPV vaccination programs implemented in lowest income countries. BMC Public Health. 2012


• Krishna D Rao, Aarushi Bhatnagar and Peter Berman. So many, yet few: Human resources for health in India. 2012, 10:19


• National Cancer Registry Programme, Time Trends in Cancer Incidence Rates: 1982-2010

• N. De Carvalhoa, J. Teixeirab, C.M. Roteli-Martinsc. Sustained efficacy and immunogenicity of the HPV-16/18 AS04-adjuvanted vaccine up to 7.3 years in young adult women. 2010, 6247-55


• Neerja Bhatla,, Neena Lal, Yan-Ping Bao, Timothy Ng, You-Lin Qiao A meta-analysis of human papillomavirus type-distribution in women from South Asia: Implications for vaccination, Vaccine 26 (2008) 2811–2817


• Sreejata Raychaudhuri, Sukanta Mandal. Current Status of Knowledge, Attitude and Practice (KAP) and Screening for Cervical Cancer in Countries at Different Levels of Development. Asian Pacific J Cancer Prev.13 (9), 4221-4227.


• TN Cervical Cancer Screening Pilot Program.


• Weekly epidemiological record Relevé épidémiologique hebdomadaire. 2009, 84, 117–132
ABOUT THE INSTITUTE

The IMS Institute for Healthcare Informatics leverages collaborative relationships in the public and private sectors to strengthen the vital role of information in advancing healthcare globally. Its mission is to provide key policy setters and decision makers in the global health sector with unique and transformational insights into healthcare dynamics derived from granular analysis of information.

Fulfilling an essential need within healthcare, the Institute delivers objective, relevant insights and research that accelerate understanding and innovation critical to sound decision making and improved patient care. With access to IMS’s extensive global data assets and analytics, the Institute works in tandem with a broad set of healthcare stakeholders, including government agencies, academic institutions, the life sciences industry and payers, to drive a research agenda dedicated to addressing today’s healthcare challenges.

By collaborating on research of common interest, it builds on a long-standing and extensive tradition of using IMS information and expertise to support the advancement of evidence-based healthcare around the world.

For more information visit www.theimsinstitute.org
Highly portable HPV testing

New careHPV™ Test

The careHPV Test — easy to use, effective, and accurate

The careHPV Test offers:

- Detection of 14 high-risk HPV types
- Convenient test results in 2.5 hours for possible same-day follow-up
- Accurate, robust, and accessible for primary screening
- High clinical sensitivity and specificity

Trademarks: QIAGEN®, careHPV™ (QIAGEN Group).

QIAGEN India Pvt. Ltd.
Customer Care : 1800 102 4114 Fax : 1800 103 4114 Technical : 1800 102 4115
Email : customercare-india@qigien.com
www.qiagen.com
ASSOCHAM:
THE KNOWLEDGE ARCHITECT OF CORPORATE INDIA EVOLUTION OF VALUE CREATOR

ASSOCHAM initiated its endeavour of value creation for Indian industry in 1920. Having in its fold more than 300 Chambers and Trade Associations, and serving more than 350000 members from all over India. It has witnessed upswings as well as upheavals of Indian Economy, and contributed significantly by playing a catalytic role in shaping up the Trade, Commerce and Industrial environment. Today, ASSOCHAM has emerged as the fountainhead of Knowledge for Indian industry, which is all set to redefine the dynamics of growth and development in the technology driven cyber age of ‘Knowledge Based Economy’. ASSOCHAM derives its strength from its Promoter Chambers and other Industry/Regional Chambers/Associations spread all over the world.

VISION
Empower enterprise by inculcating knowledge that will be the catalyst of growth in the barrierless technology driven global market and help them upscale, align and emerge as formidable player in respective business segments.

MISSION
As a representative organ of Corporate India, ASSOCHAM articulates the genuine, legitimate needs and interests of its members. Its mission is to impact the policy and legislative environment so as to foster balanced economic, industrial and social development. We believe education, IT, BT, Health, Corporate Social responsibility and environment to be the critical success factors.

MEMBERS - OUR STRENGTH
ASSOCHAM represents the interests of more than 350000 direct and indirect members. Through its heterogeneous membership, ASSOCHAM combines the entrepreneurial spirit and business acumen of owners with management skills and expertise of professionals to set itself apart as a Chamber with a difference. Currently, ASSOCHAM has 90 Expert Committees covering the entire gamut of economic activities. It has been especially acknowledged as a significant voice of the industry in the field of Information Technology, Biotechnology, Telecom, Banking & Finance, Company Law, Corporate Finance, Economic and International Affairs, Tourism, Civil Aviation, Corporate Governance, Infrastructure, Energy & Power, Education, Legal Reforms, Real Estate & Rural Development etc.